

Claims

- [c1] A sealed electron beam source for an imaging tube comprising:
- a source housing comprising;
 - a source window having a first voltage potential; and
 - a source electrode having a second voltage potential and generating electrons, said source electrode emitting said electrons through said source window to a target external to said source housing.
- [c2] A source as in claim 1 further comprising:
- a coolant channel housing thermally coupled to and at least partially defined by said source housing comprising;
 - a coolant channel; and
 - a coolant flowing therein, said coolant absorbing heat from said source housing.
- [c3] A source as in claim 2 wherein said source window further comprises feedthroughs for said coolant to flow therein and absorb heat from said source window.
- [c4] A source as in claim 1 wherein said source window allows direct electron emission to pass through said

source window to said target and prevents indirect electron emission from passing through said source window.

- [c5] A source as in claim 1 wherein said source electrode comprises at least one of a thermionic tungsten wire coil, a field emitter array, or a photoemitter.
- [c6] A source as in claim 1 wherein said source electrode is a focusing electrode.
- [c7] A source as in claim 1 wherein said source electrode has a variable potential.
- [c8] A source as in claim 1 further comprising a grid coupled between said source electrode and said target, said grid focusing said electrons.
- [c9] A source as in claim 1 wherein the sealed electron beam source is a complete and separate sub-assembly of an imaging tube.
- [c10] A sealed electron beam source system for an imaging tube comprising:
 - a target having a third voltage potential and decelerating electrons to generate x-rays; and
 - a sealed electron beam source comprising;
 - a source housing comprising;
 - a source window having a first voltage potential; and

a source electrode having a second voltage potential and generating said electrons, said source electrode emitting said electrons through said source window to said target.

[c11] A system as in claim 10 wherein said third voltage potential is approximately equal to said first voltage potential.

[c12] A system as in claim 10 further comprising:
a coolant channel housing thermally coupled to and at least partially defined by said source housing comprising;
a coolant channel; and
a coolant flowing therein, said coolant absorbing heat from said source housing.

[c13] A system as in claim 10 further comprising:
a frame coupled within the imaging tube; and
a low-pressured cavity fluidically coupled between said frame and said target, said low-pressured cavity at least partially defined by said frame, said target, and said sealed electron beam source;
said low-pressured cavity is at least partially exhausted or filled with a low-pressure gas.

[c14] A system as in claim 13 wherein said low-pressure gas comprises at least one of a low-Z substance, helium, ni-

trogen, or argon.

- [c15] A system as in claim 10 wherein said sealed electron beam source is directed at said target at a glancing angle.
- [c16] A system as in claim 10 wherein said source window allows direct electron emission to pass through said source window to said target and prevents indirect electron emission from passing through said source window.
- [c17] A method of supplying and directing electrons on a target within an imaging tube comprising:
 - forming a source housing over a source electrode;
 - sealing the source housing;
 - generating and emitting electrons from said source electrode; and
 - directing said electrons through a source window to a target.
- [c18] A method as in claim 17 wherein directing said electrons through a source window further comprises:
 - allowing direct electron emission to pass through said source window; and
 - preventing indirect electrons from passing through said source window.
- [c19] A method as in claim 17 further comprising cooling said

source housing via a coolant channel housing.

[c20] A method as in claim 17 further comprising utilizing low-pressured gas to enhance heat transfer between said target and a frame of the imaging tube.